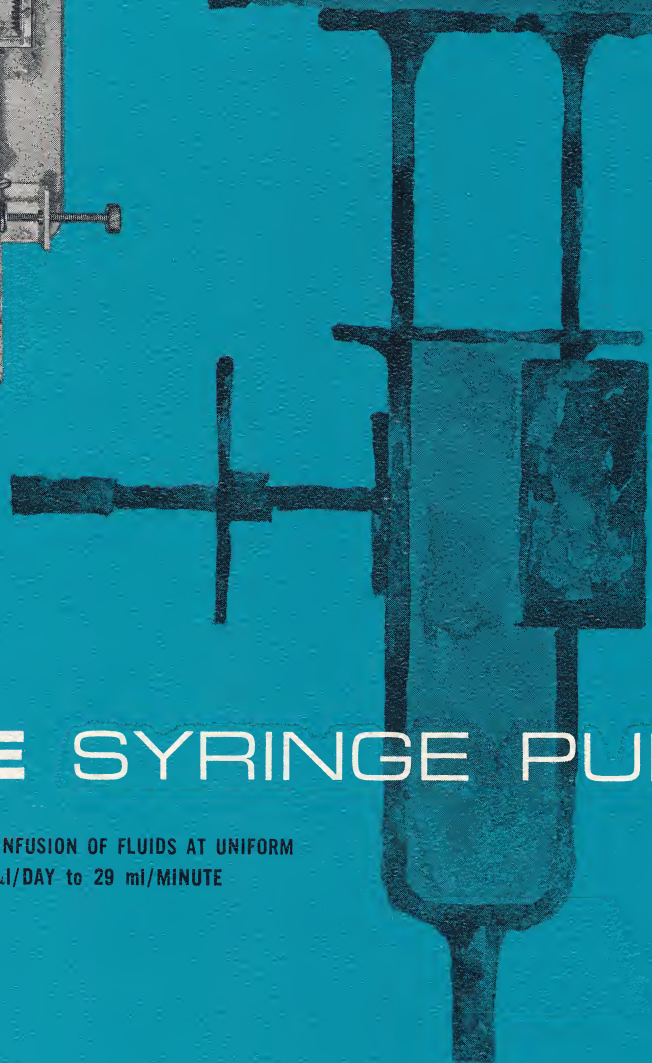
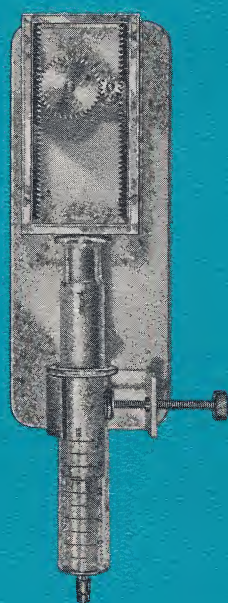
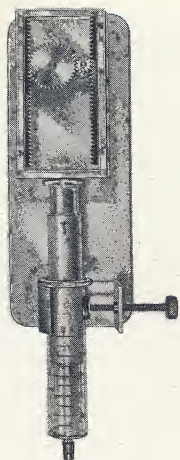




SAGE SYRINGE PUMPS

ACCURATE, REPRODUCIBLE INFUSION OF FLUIDS AT UNIFORM
FLOW RATES FROM 0.014 μ l/DAY to 29 ml/MINUTE



SAGE SYRINGE PUMPS

ACCURATE, REPRODUCIBLE INFUSION OF FLUIDS AT UNIFORM
FLOW RATES FROM 0.014 μ l/DAY to 29 ml/MINUTE

Sage Syringe Pumps provide uniform, accurate, and reproducible infusion of fluids. Two types are available: constant speed models which drive syringes at a number of discrete rates; variable speed models which offer continuously adjustable rates over a wide range. Each is available in two sizes: large units accommodate syringes from microliter size up to 100 cc capacity; small units accept up to 10 cc size syringes. All models may be fitted with a double syringe holder accessory for pumping two syringes (for two channels) simultaneously. Infusion/withdrawal versions are available in the large size pumps. All models are compact in size, easy to use, and reliable in operation. They fulfill a wide variety of laboratory, medical, and industrial applications. Since the flow rates are unaffected by changes in back pressure or variations in line voltage (within specifications), the pumps provide precision flow rates unattainable by most other types of pumps.

Use of standard glass or plastic syringes permits pumping under sterile conditions. Ground glass type, interchangeable type, and disposable syringes may all be used. Gas-tight syringes are specially useful for pumping gas, low viscosity fluids and in other applications where leakage is a particular problem, or where small negative pressures are present.

BASIC PUMP MECHANISM: The pump consists of a compact box housing the motor and drive assembly. Above the box is a pair of gears (one drive and one idler) which engage mating racks on a driving carriage which drives the syringe plunger. Just before the plunger bottoms, the driving carriage simply disengages from the gears and pumping ceases. No cut off switch is necessary. The unit is readily reset for further pumping by simply lifting and repositioning the carriage. The drive and idler gears may be quickly interchanged to provide different flow rates, and an optional alternate gear set (for constant speed models) provides additional rates.

application data

Sage Syringe Pumps are useful in a wide range of applications in the analytical, medical, biological, and industrial areas — wherever fluids must be moved at precise, reproducible flow rates.

SOME TYPICAL APPLICATIONS

ANALYTICAL TECHNIQUES

Automatic Titration: Can be used to convert a pH meter and chart recorder to an automatic titration apparatus. The time axis of the recorder is used to calculate volume since the flow rate is accurately known.

Atomic Absorption Spectrophotometry and Flame Photometry: Samples of varying viscosities may be introduced at precise, controlled flow rates.

Column Chromatography, Curtain Electrophoresis, Sucrose Gradient Work: Accurate and uniform delivery of liquids at predetermined flow rates permits running procedures, unattended, over long periods of time.

MEDICAL AND BIOLOGICAL APPLICATIONS

Physiology, Hemodialysis: Heparin, saline, and other drugs are being infused intravenously and extracorporeally in connection with artificial kidney use, other clinical procedures.

Rapid Infusion into Laboratory Animals: Repetitive infusions at pre-selected rates into small animals.

Radiology-Lymphangiography: Variable Speed syringe pump with double syringe holder permits controlled continuous infusion of radio-opaque drugs simultaneously into both feet of patient.

Obstetrics-Labor Inducing Drugs: Individual characteristics of the mother call for different rates of infusion of drugs to produce the desired result without side effects. Rate can be changed as labor progresses.

Chemotherapy: For continuous controlled infusion of anti-cancer and other drugs.

Feeding Cultures: Low flow rates permit long-term, continuous perfusion.

PROCESS APPLICATIONS

Depositing thin layers (pigment, etc.) on continuous strips (film, paper, etc.) Pre-pilot plant studies, etc.

Repetitive Filling of Ampules, Other Containers: With an interval timer, the variable speed pump will accurately deliver predetermined small volumes with great reproducibility.

INFUSION / WITHDRAWAL APPLICATIONS

Sampling of process lines

Air pollution studies

Physiological studies of blood, other body fluids

Pumping into negative pressures

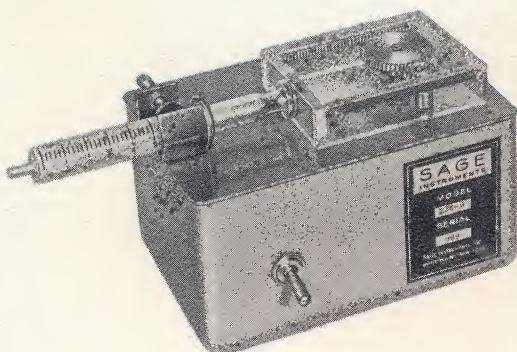
constant speed syringe pumps

Sage Constant Speed Pumps are driven by synchronous motors with a reproducibility of better than $\pm 0.1\%$. A large number of discrete flow rates is readily achieved through various combinations of syringe size and "quick-change" gears supplied with the pump.

variable speed syringe pumps

Sage Variable of continuous by means of mounted on directly in pe syringe size an Model 255-2 large gear in d

SERIES 234

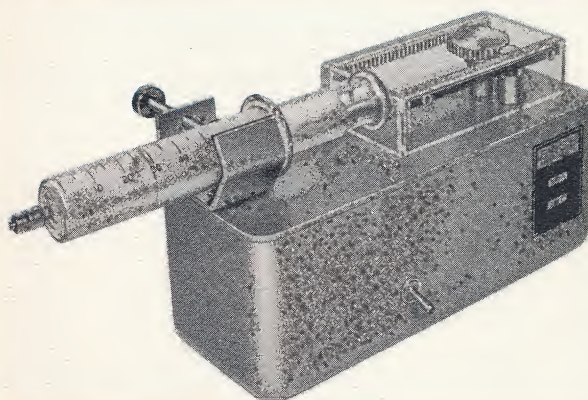


Small Constant Speed Syringe Pump

Each pump in the 234 Series is supplied with a universal holder for syringe sizes up to 10 cc, and a set of two interchangeable gears. An optional set of two gears is also available.

There are seven models in this series, each of which has a different speed motor and covers a different flow rate range. Four different flow rates for a given syringe can be obtained from each model by virtue of the four gears available (A and D gears standard, B and C gears optional accessories).

SERIES 249

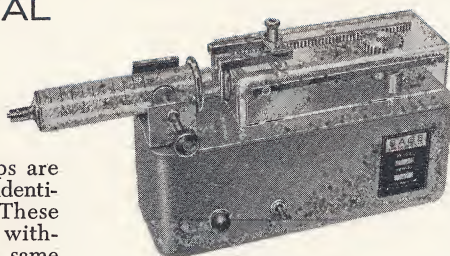


Large Constant Speed Syringe Pump

Each Series 249 pump comes with a universal syringe holder that accommodates all syringes up to 100 cc size. There are six models in this series, each of which covers a different flow rate range. Each model yields three different rates for each syringe (two from the standard A and C gears supplied, plus one from the optionally available B and B gear set).

INFUSION/WITHDRAWAL MODELS

Sage Series 249 and 255 Syringe Pumps are available in infusion/withdrawal models identified as 249W and 255W respectively. These pumps provide the added versatility of withdrawing as well as infusing fluids at the same rates as the infusion models. The driving carriage carries a clamp arrangement that latches onto the lip of the syringe piston for the withdrawal stroke. A three-way switch sets Infusion/Off/Withdrawal. A safety switch automatically turns the pump off at the pre-set limit of the withdrawal stroke. Only a single syringe may be used in the withdrawal mode.



UNIVERSAL SYRINGE HOL

Universal syringe holders are supplied in two sizes. One, supplied with the small Series 234 and 237 pumps, accommodates all syringes from 0.5 μ l up to 10 cc capacity. The larger holder is supplied with the Series 249 and 255 pumps and will accommodate all syringes up to 100 cc capacity.

DOUBLE SYRINGE HOLDE

Double Syringe Holders for two-channel pumping are optional accessories. The Model 283 Double Holder accepts any two syringes up to 50 cc capacity each. It may be used with any of the large model pumps (Series 249 or 255). The Model 196 Double Holder is used with the smaller pumps (Series 234 and 237), and accepts two syringes up to 10 cc capacity each. Infusion-withdrawal models may use the double holder, but can withdraw only a single syringe at a time.

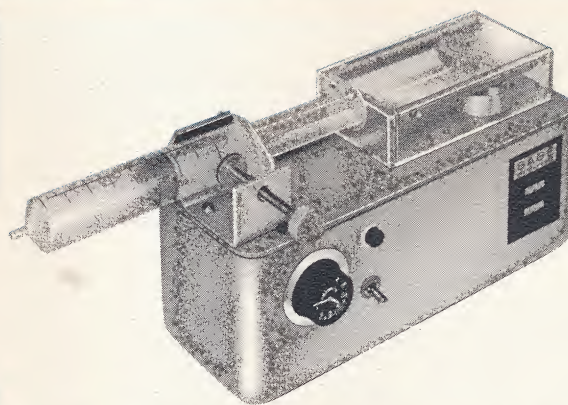
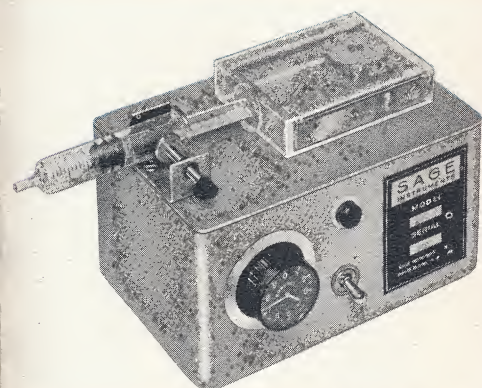
Speed Pumps provide a wide range of variable flow rates. Rate is selected by a linearly calibrated ten turn dial on the pump chassis. The dial reads percent of maximum flow for a given gear arrangement. For example, the pump with a 20cc syringe and the drive in position, has a nominal maximum

flow rate of 30 ml/hr. This is at the 100.0 setting. A dial setting of 50.0 gives 50% of the maximum flow or 15 ml/hr. The minimum dial setting is 04.0 (for all variable speed pumps), yielding a flow rate of 4% of maximum or 1.2 ml/hr with a 20cc syringe. An additional flow rate range for a given syringe can be achieved by interchanging the drive and idler gears.

In addition to the basic pump mechanism and the flow control dial, the pump chassis houses an electronic feedback circuit that regulates the permanent magnet DC pump motor to a reproducibility of $\pm 0.5\%$ full scale independent of changes in back pressure (within limits specified) or variations in line voltage up to $\pm 10\%$.

SERIES 237

SERIES 255



Small Variable Speed Pump

Series 237 pumps cover rate ranges of more than 1,000,000:1 using syringes varying in size from 0.5 μ l up to 10 cc. This series is available in three models providing different speed ranges. Each offers a continuously variable range of 62.5 to 1 with any one syringe size. Overall flow rate ranges are:

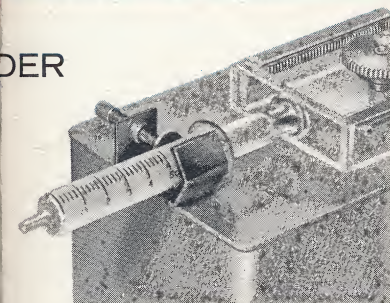
- Model 237-1: 0.014 μ l/min to 17 ml/min
- Model 237-2: 0.044 μ l/hr to 56 ml/hr
- Model 237-3: 0.055 μ l/day to 67 ml/day

Large Variable Speed Pump

Series 255 pumps cover rate ranges of more than 5,000,000:1 using syringes of 0.5 μ l up to 100 cc capacities. The pump is available in three models providing different speed ranges. Each offers a continuously variable rate range of 75:1 with any one syringe size. Overall flow rate ranges are:

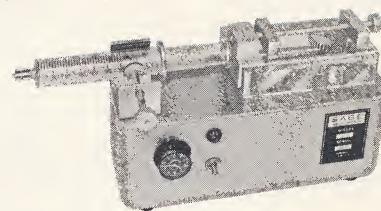
- Model 255-1: 0.0034 μ l/min to 29 ml/min
- Model 255-2: 0.011 μ l/hr to 98 ml/hr
- Model 255-3: 0.014 μ l/day to 118 ml/day

DER

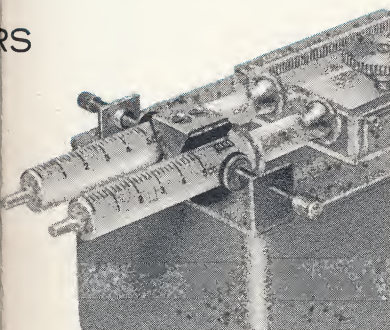


RAPID ADVANCE CARRIAGE

The Model 217 Rapid Advance Carriage (for Series 249 and 255 pumps) permits manually advancing the carriage $\frac{1}{2}$ inch, and is useful for rapidly filling tubing from the syringe or for rapidly clearing any backflow of liquid which may occur during initial setup of the pump.

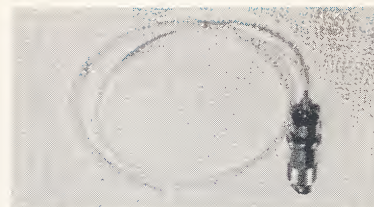


RS



WATERTIGHT SWIVEL

The Model 120 Swivel is a leak-proof rotating coupling that permits continuous infusion into small, unrestrained animals. For example, with the swivel suspended above the cage, a catheter connected to the swivel will turn freely without leakage. Overall length of the swivel is $1\frac{3}{4}$ inches. One end terminates in a female luer fitting, the other in a tube of 19 gauge needle size. It is supplied with a two foot length of tubing that fits tightly onto the needle.



FLOW RATES AVAILABLE WITH SAGE SERIES 234 SMALL CONSTANT SPEED SYRINGE PUMP

Syringe			10 cc	5 cc	2 cc	1 cc Tuberculin	¼ cc Tuberculin	10 µl *
Model	Drive Gear	Idler Gear	ml/Min					µl/Min
234-1	A	D	6.73	4.31	2.49	0.688	0.341	6.73
	B	C	10.1	6.47	3.73	1.03	0.512	10.1
	C	B	13.5	8.62	4.98	1.38	0.682	13.5
	D	A	16.8	10.8	6.22	1.72	0.853	16.8
234-2	A	D	1.68	1.08	0.622	0.172	0.0852	1.68
	B	C	2.52	1.62	0.933	0.258	0.128	2.52
	C	B	3.37	2.16	1.24	0.344	0.171	3.37
	D	A	4.20	2.70	1.56	0.430	0.212	4.20
234-3	A	D	0.449	0.287	0.166	0.0460	0.0227	0.449
	B	C	0.674	0.431	0.249	0.0690	0.0341	0.674
	C	B	0.898	0.574	0.332	0.0920	0.0454	0.898
	D	A	1.12	0.720	0.415	0.115	0.0568	1.12
ml/Hr								µl/Hr
234-4	A	D	6.73	4.31	2.49	0.688	0.341	6.73
	B	C	10.1	6.47	3.73	1.03	0.512	10.1
	C	B	13.5	8.62	4.98	1.38	0.682	13.5
	D	A	16.8	10.8	6.22	1.72	0.853	16.8
234-5	A	D	1.68	1.08	0.622	0.172	0.0852	1.68
	B	C	2.52	1.62	0.933	0.258	0.128	2.52
	C	B	3.37	2.16	1.24	0.344	0.171	3.37
	D	A	4.20	2.70	1.56	0.430	0.212	4.20
234-6	A	D	0.421	0.269	0.156	0.0430	0.0213	0.421
	B	C	0.631	0.404	0.233	0.0645	0.0320	0.631
	C	B	0.842	0.538	0.311	0.0860	0.0423	0.842
	D	A	1.05	0.673	0.390	0.108	0.0530	1.05
ml/Day								µl/Day
234-7	A	D	2.24	1.44	0.829	0.229	0.114	2.24
	B	C	3.36	2.16	1.24	0.344	0.171	3.36
	C	B	4.49	2.88	1.66	0.458	0.227	4.49
	D	A	5.60	3.60	2.07	0.573	0.285	5.60

Note: A and D gears are supplied with pump. B and C gear set is available as an optional accessory (order Model 226).

FLOW RATES AVAILABLE WITH SAGE SERIES 249 LARGE CONSTANT SPEED SYRINGE PUMP

Syringe			100 cc	50 cc	30 cc	20 cc	10 cc	5 cc	1 cc	¼ cc	10 µl *
Model	Drive Gear	Idler Gear	ml/Min								µl/Min
249-1	A	C	9.83	6.14	4.01	3.0	1.68	1.08	0.172	0.085	1.68
	B	B	19.7	12.3	8.03	6.0	3.37	2.16	0.344	0.171	3.37
	C	A	29.5	18.4	12.0	9.0	5.05	3.24	0.516	0.256	5.05
249-2	A	C	2.45	1.53	1.00	0.746	0.421	0.269	0.043	0.021	0.421
	B	B	4.90	3.06	2.00	1.49	0.842	0.538	0.086	0.042	0.842
	C	A	7.35	4.59	3.00	2.24	1.26	0.707	0.129	0.064	1.26
ml/Hr											µl/Hr
249-3	A	C	39.3	24.5	16.0	12.0	6.73	4.31	0.688	0.341	6.73
	B	B	78.6	49.1	32.1	24.0	13.5	8.62	1.38	0.682	13.5
	C	A	117.	73.6	48.2	36.0	20.2	12.9	2.06	1.02	20.2
249-4	A	C	9.83	6.14	4.01	3.00	1.68	1.08	0.172	0.085	1.68
	B	B	19.7	12.3	8.03	6.00	3.37	2.16	0.344	0.171	3.37
	C	A	29.5	18.4	12.0	9.00	5.05	3.24	0.516	0.256	5.05
249-5	A	C	2.45	1.53	1.00	0.746	0.421	0.269	0.043	0.021	0.421
	B	B	4.90	3.06	2.00	1.49	0.842	0.538	0.086	0.042	0.842
	C	A	7.35	4.59	3.00	2.24	1.26	0.707	0.129	0.064	1.26
ml/Day											µl/Day
249-6	A	C	14.7	9.20	6.02	4.50	2.53	1.62	0.260	0.130	2.53
	B	B	29.4	18.4	12.0	9.00	5.06	3.24	0.520	0.260	5.06
	C	A	44.1	27.7	18.1	13.5	7.59	4.86	0.780	0.390	7.59

Note: A and C gears are supplied with pump. B and B gear set is available as an optional accessory (order Model 259).

Flow rates are nominal since syringes vary. Those shown are based on B-D MULTIFIT syringes. Interchangeable, ground glass, and disposable type syringes from various manufacturers may be used.

* Microliter syringes manufactured by Hamilton are available in 0.5, 1, 10, 50, 100 and 250 µl sizes. To obtain flows for syringes other than 10 µl multiply flow by syringe volume relative to 10 µl — For example a 1 µl syringe will give flows 1/10 of those of a 10 µl syringe and a 50 µl syringe will give flows 5 times greater than those of the 10 µl syringe.

FLOW RATE RANGES AVAILABLE WITH SAGE SERIES 255 LARGE VARIABLE SPEED SPRING PUMP

Syringe		100 cc	50 cc	30 cc	20 cc	10 cc	5 cc	1 cc	¼ cc	10 µl *
Model	Drive Gear	ml/Min								µl/Min
255-1	Small	0.39-9.8	0.24-6.1	0.16-4.0	0.12-3.0	0.068-1.7	0.044-1.1	0.0068-0.17	0.0034-0.086	0.068-1.7
	Large	1.2-29	0.72-18	0.48-12	0.36-9.0	0.20-5.0	0.13-3.2	0.021-0.52	0.010-0.26	0.20-5.0
ml/Hr										µl/Hr
255-2	Small	1.3-32	0.80-20	0.52-13	0.40-9.9	0.22-5.6	0.14-3.6	0.023-0.57	0.011-0.28	0.22-5.6
	Large	3.9-98	2.4-61	1.6-40	1.2-30	0.68-17	0.44-11	0.068-1.7	0.034-0.86	0.68-17
ml/Day										µl/Day
255-3	Small	1.6-39	1.0-25	0.64-16	0.48-12	0.27-6.7	0.17-4.3	0.028-0.69	0.013-0.34	0.27-6.7
	Large	4.7-118	3.0-74	1.9-48	1.4-36	0.8-20	0.52-13	0.084-2.1	0.040-1.0	0.80-20

FLOW RATE RANGES AVAILABLE WITH SAGE SERIES 237 SMALL VARIABLE SPEED SYRINGE PUMP

Syringe		10 cc	5 cc	2 cc	1 cc	¼ cc	10 µl *
Model	Drive Gear	ml/Min					µl/Min
237-1	Small	0.27-6.7	0.17-4.3	0.10-2.5	0.028-0.69	0.014-0.35	0.27-6.7
	Large	0.67-17	0.43-11	0.25-6.3	0.069-1.7	0.035-0.86	0.67-17
ml/Hr							µl/Hr
237-2	Small	0.88-22	0.56-14	0.33-8.3	0.092-2.3	0.044-1.1	0.88-22
	Large	2.2-56	1.4-36	0.83-21	0.23-5.8	0.11-2.9	2.2-56
ml/Day							µl/Day
237-3	Small	1.1-27	0.68-17	0.40-10	0.11-2.8	0.056-1.4	1.1-27
	Large	2.7-67	1.7-43	1.0-25	0.28-6.9	0.14-3.4	2.7-67

Flow rates are nominal since syringes vary. Those shown are based on B-D MULTIFIT syringes. Interchangeable, ground glass, and disposable type syringes from various manufacturers may be used.

* Microliter syringes manufactured by Hamilton are available in 0.5, 1, 10, 50, 100 and 250 µl sizes. To obtain flows for syringes other than 10 µl multiply flow by syringe volume relative to 10 µl—For example a 1 µl syringe will give flows 1/10 of those of a 10 µl syringe and a 50 µl syringe will give flows 5 times greater than those of the 10 µl syringe.

BACK PRESSURE: The back pressures against which the pumps operate are a function of syringe size. The 100 cc syringe may be driven against pressures as great as 300 mm of Hg; the 10 cc syringe will pump against at least an atmosphere, and smaller size syringes will pump against still greater back pressures.

ORDERING INFORMATION:

1. Decide on variable or constant speed pump. According to flow rate and capacity required, select desired model number from the Flow Rate Chart. Be sure to include dash number e.g., 255-2 not 255; 234-7 not 234.
2. If a constant speed pump is ordered, please specify if you will require the extra (optional) set of gears.
3. A Model 196 double syringe holder may be used on Series 234 and 237 type pumps. The Model 283 double holder may be used with Series 249 or 255 pumps only.

POWER REQUIREMENTS: All Sage Variable Speed Syringe Pumps operate from 115v/50-60 cycle power. Constant speed models operate from 115v/60 cycle. In 50 cycle lines constant speed models produce 5/6ths of the flow rates indicated on the charts in this bulletin.

WEIGHT & DIMENSIONS

	Weight (approx.)	Dimensions
Series 255	5½ lbs.	10½" x 4" x 6½"
Series 249	5¾ lbs.	10½" x 4" x 6½"
Series 237	3¼ lbs.	6" x 4" x 4⅝"
Series 234	3 lbs.	6" x 4" x 4⅝"

SAGE
INSTRUMENTS, INC.

2 SPRING STREET ■ WHITE PLAINS, NEW YORK 10601 ■ 914 WH 9-4121

PRICE LIST FOR SAGE SYRINGE PUMPS

Constant Speed Models 234 and 249
Variable Speed Models 237 and 255

Small Constant Speed Pumps Model 234-1 through 234-7	\$ 145.00
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Large Constant Speed Pumps Model 249-1 through 249-6	215.00
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Small Variable Speed Pumps Model 237-1 through 237-3	325.00
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Large Variable Speed Pumps Model 255-1 through 255-3	395.00
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Infusion – Withdrawal Models 249W and 255W

Large Constant Speed Pumps Model 249W-1 through 249W-6	290.00
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Large Variable Speed Pumps Model 255W-1 through 255W-3	470.00
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ACCESSORIES

Model 196 Double Syringe holder for two syringes up to 10 cc (for small pumps)	20.00
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Model 283 Double Syringe holder for two syringes up to 50 cc (for large pumps)	35.00
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Model 226 alternate gear set for Small Constant Speed Pumps	15.00
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Model 259 alternate gear set for Large Constant Speed Pumps	15.00
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Model 217 Rapid-Advance Carriage for Large Pumps	32.50
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Model 120 Water-tight Swivel	30.00
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(Syringes are not included with Pumps)

All prices F.O.B. White Plains, New York. Terms: Net 30 days.

(Prices & specifications subject to change without notice)

SAGE INSTRUMENTS, INC.
2 Spring Street
White Plains, New York 10601
914 White Plains 9-4121

SAGE INSTRUMENTS, INC.

2 SPRING STREET, WHITE PLAINS, N. Y. 10601 • PHONE: 914 WH 9-4121

November 1966

Dear Sir:

Help! Even before you read the enclosed new Syringe Pump catalog, won't you take a few seconds to fill out and mail the postage-free card?

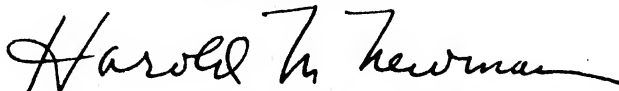
Our mailing list has grown quite large and somewhat out of date. We would like to start fresh with just those of you who find our catalogs and application literature informative and useful. A card from you will tell us that you would like to remain on our mailing list.

With regard to the enclosed catalog, may we call to your particular attention our Series 255 pumps. At \$395, they are our most expensive syringe pumps. (Others are priced as low as \$145.) However, the 255's are ordered and re-ordered by more of our customers than any others in our line.

Their ability to deliver any flow rate you desire, over a 5 million to one range, uniformly and reproducibly, provides versatility far beyond that attainable with any other such pump. We believe a Sage Series 255 pump will provide you with an unsurpassed instrument for infusing fluids and introducing samples. Infusion/withdrawal versions are also available.

If you would like a demonstration, please be sure to note this on the card.

Sincerely,



Harold M. Newman
President

HMN/msn
Enclosures